

Amendments to the Claims

Claim 1(Currently Amended). An apparatus for perforating a

tubular structure, the apparatus comprising:

a housing having a first end defining an inlet, the housing being
supportable at a selected position in the tubular structure and
defining an operating fluid flow path beginning with the inlet;

a fluid driven perforating assembly in the housing, the perforating
assembly comprising a piercing member supported for movement
from a first position within the housing to a second position in
which a portion of the piercing member is extendable through the
tubular structure forming a perforation therein, wherein the
piercing member comprises a fluid flow path;

wherein the perforating assembly defines a fluid flow path continuous
with the operating fluid flow path through the housing and the
fluid flow path in the piercing member so that when the piercing
member is in the second position a continuous flow path is formed
between the inlet of the housing and the portion of the piercing
member that this extendable through the tubular structure;

~~a seal assembly comprising an elastic seal adapted to provide a seal
between the inside of the tubular structure outside the
apparatus and the fluid flow paths in the housing, the piercing
member and the perforating assembly of the apparatus; and~~

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a fluid driven setting/pack-off assembly adapted to releasably secure
the housing at the selected position in the tubular structure
and to provide a releasable seal between the inside of the
tubular structure outside the apparatus and the fluid flow
paths in the housing, the piercing member and the perforating
assembly of the apparatus; and
a non-electrical control assembly adapted to control movement of the
piercing member and setting/pack-off assembly.

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Claim 2 (Original). The apparatus of claim 1 wherein the first end of the
housing is adapted for connection to an elongate conduit extending from one end of the
tubular structure so that the conduit is continuous with the inlet of the housing.

Claim 3 (Previously Presented). The apparatus of claim 2 wherein the
apparatus further comprises a releasable lock assembly operable by rotation of the
elongate conduit between a locked position, in which the elongate conduit is fixed
relative to the housing, and an unlocked position, in which the elongate conduit is axially
5 movable relative to the housing.

Claim 4 (Previously Presented). The apparatus of claim 3 further
comprising a friction member on the housing sized to frictionally engage the tubular
structure as the apparatus is pushed through the tubular structure.

Claim 5 (Original). The apparatus of claim 4 wherein the friction
member is a bow-spring centralizer.

Claim 6 (Previously Presented). The apparatus of claim 3 wherein the perforating assembly comprises a cylinder, wherein the piercing member is slidably supported in the cylinder, wherein the perforating assembly further comprises a first fluid-driven piston in the cylinder for driving the movement of the piercing member, wherein the apparatus further comprises a pressurized fluid reservoir fluidly connected to the cylinder so that when the reservoir is filled with pressurized fluid the fluid can drive the piston, and wherein the control assembly comprises a valve adapted to control the flow of pressurized fluid from the reservoir to the cylinder.

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Claim 7 (Currently Amended). The apparatus of claim 6 wherein the ~~seal assembly comprises a setting/pack-off assembly adapted to secure the apparatus at the selected position in the tubular structure, the setting/pack-off assembly comprising~~ comprises:

5 a back-up plate sized to engage the tubular structure and movable in a first direction from a retracted position in which the back-up plate does not engage the tubular structure to an extended position in which the back-up plate engages the tubular structure;

a packer on the sidewall opposite the back-up plate shaped and positioned to surround the piercing member when the piercing member is in the second position;

a cylinder supported in the housing;

a fluid-driven piston sealingly slidable within the cylinder and dividing the cylinder into a first chamber and a second chamber;

15 a stem extending between the back-up plate and piston and;

wherein the first chamber of the cylinder is fluidly connected to the
pressurized fluid reservoir to push the piston in the first direction
when the reservoir contains pressurized fluid; and
wherein the valve controls the flow of fluid from the fluid reservoir to the cylinder of the
20 setting/pack-off assembly.

Claim 8 (Currently Amended). The apparatus of claim 7 wherein the
housing is cylindrical defining a sidewall, wherein the piercing member extends radially
through the sidewall, and wherein the back-up plate extends radially from the sidewall of
the housing and is positioned to move opposingly to the piercing member, ~~and wherein~~
5 ~~the elastic seal comprises a packer on the sidewall opposite the back-up plate.~~

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Claim 9 (Previously Presented). The apparatus of claim 7 wherein the
piercing member comprises a base and is movable from the second position to a third
position in which the base is extendable through the perforation made by the piercing
member to occlude the perforation, wherein first piston of the perforating assembly
5 comprises a recess, wherein the perforating assembly further comprises a second fluid-
driven piston slidably receivable in the recess for driving movement of the piercing
member from the second position to the third position, wherein the recess is fluidly
connected to the pressurized fluid reservoir so that when the reservoir is filled with
pressurized fluid the fluid can drive the movement of the second piston, and wherein the
10 valve is adapted to control the flow of fluid from the reservoir to the recess.

Claim 10 (Original). The apparatus of claim 9 wherein the valve comprises:

5 a valve body having a tubular sidewall defining a longitudinal throughbore, wherein the sidewall comprises a first inlet fluidly connected to the pressurized fluid reservoir, and a plurality of longitudinally spaced-apart outlets, a first one of the plurality of outlets fluidly connected to the first chamber of the cylinder of the setting/pack-off assembly to drive the piston in the first direction, a
10 second one of the plurality of outlets fluidly connected to the cylinder of the perforating assembly to drive the movement of the first piston, a third one of the plurality of outlets fluidly connected to the cylinder of the perforating assembly to drive the movement of the second piston;

a sleeve sealingly slidable inside the throughbore of the valve body;

15 wherein the sleeve comprises an outer wall, an inner wall, an annular space therebetween, a fluid inlet in the outer wall in fluid communication with the annular space, and a plurality of outlets in the outer wall in fluid communication with the annular space, each one of the plurality of outlets corresponding to a respective one of
20 the plurality of outlets in the valve body;

wherein the sleeve is axially movable from a closed position, in which none of the outlets in the sleeve is aligned with an outlet in the body, to a plurality of valving positions including a first valving

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position in which the first outlet in the body is aligned with the corresponding outlet in the sleeve, a second valving position in which the second outlet in the body is aligned with the corresponding outlet in the sleeve, and a third valving position in which the third outlet in the body is aligned with the corresponding outlet in the sleeve; and

30 wherein the apparatus further comprises a push tube slidably supported in the housing and having first and second ends, the first end connectable to the elongate conduit for axial movement therewith when the lock assembly is in the unlocked position, the second end sized and positioned to engage the sleeve of the valve to cause axial movement thereof to move the sleeve from the closed position to the plurality of valving positions.

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Claim 11 (Original). The apparatus of claim 10 wherein the apparatus further comprises a dump chamber adapted to receive fluid, wherein the back-up plate is further defined as movable in a second direction from the extended position to the retracted position, wherein the plurality of outlets in the valve body includes a fourth
5 outlet fluidly connected to the second chamber of the cylinder of the setting/pack-off assembly to drive the movement of the piston in the second direction, wherein the valve body includes a second inlet fluidly connected to the first chamber of the cylinder of the setting/pack-off assembly, wherein the valve body includes a fifth outlet fluidly connected to the dump chamber, wherein the sleeve of the valve comprises a pass-
10 through channel, and wherein the sleeve is movable to a fourth valving position in which the fourth outlet in the body is aligned with the corresponding outlet in the sleeve to direct pressurized fluid into the second chamber of the back-up plate cylinder and in

which the pass-through channel in the sleeve connects the second inlet of the valve body with the fifth outlet to permit fluid in the first chamber of the back-up plate cylinder to
15 escape to the dump chamber.

Claim 12 (Original). The apparatus of claim 11 wherein the push tube defines a flow passage continuous with the elongate conduit, wherein the push tube is sealingly slidable on the support stem in the housing, wherein the support stem defines a flow passage continuous with the flow passage of the push tube, wherein the flow
5 passage of the support stem is fluidly connected to the cylinder of the perforating assembly so that the flow path in the piercing member is continuous with the support stem.

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Claim 13 (Original). The apparatus of claim 12 wherein the housing comprises a second flow path inside the housing above the valve body, wherein the housing comprises an outlet connecting the second flow path with the outside of the housing, wherein the push tube includes an opening positioned to be open to the second
5 flow path in the housing when the sleeve is in the closed position and to be sealed by the support stem when the sleeve is in one of the plurality of valving positions, so that when the apparatus is connected to the elongate outlet and positioned in the tubular structure fluid can be passed through the elongate conduit, through the push tube, through the opening in the push tube into the second flow path in the housing, through the outlet in
10 the housing to the outside of the housing.

Claim 14 (Previously Presented). The apparatus of claim 1 wherein the perforating assembly comprises a cylinder, wherein the piercing member is slidably

supported in the cylinder, wherein the perforating assembly further comprises a first fluid-driven piston in the cylinder for driving the movement of the piercing member, wherein the apparatus further comprises a pressurized fluid reservoir fluidly connected to the cylinder so that when the reservoir is filled with pressurized fluid the fluid can drive the piston, and wherein the control assembly comprises a valve adapted to control the flow of pressurized fluid from the reservoir to the cylinder.

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5 Claim 15 (Previously Presented). The apparatus of claim 14 wherein the piercing member comprises a base, wherein the piercing member is movable from the second position to a third position in which the base is extendable through the perforation made by the piercing member to occlude the perforation, wherein first piston comprises a recess, wherein the perforating assembly further comprises a second fluid-driven piston slidably receivable in the recess for driving movement of the piercing member from the second position to the third position, wherein the recess is fluidly connected to the pressurized fluid reservoir so that when the reservoir is filled with pressurized fluid the fluid can drive the movement of the second piston, and wherein the valve is adapted to control the flow of fluid from the reservoir to the recess.

Claim 16 (Original). The apparatus of claim 15 wherein the housing comprises a support stem and wherein the valve comprises:

5 a valve body having a tubular sidewall defining a longitudinal throughbore, wherein the sidewall comprises a first inlet fluidly connected to the pressurized fluid reservoir, and a plurality of longitudinally spaced-apart outlets, one of the plurality of outlets fluidly connected to the cylinder of the perforating assembly to

drive the movement of the first piston, another one of the plurality
of outlets fluidly connected to the cylinder of the perforating
assembly to drive the movement of the second piston;

a sleeve sealingly slidable inside the throughbore of the valve body;

wherein the sleeve comprises an outer wall, an inner wall, an annular
space therebetween, a fluid inlet in the outer wall in fluid
communication with the annular space, and a plurality of outlets in
the outer wall in fluid communication with the annular space, each
one of the plurality of outlets corresponding to a respective one of
the plurality of outlets in the valve body;

wherein the sleeve is axially movable from a closed position, in which
none of the outlets in the sleeve is aligned with an outlet in the
body, to a plurality of valving positions including one valving
position in which an outlet in the body is aligned with the
corresponding outlet in the sleeve to fluidly connect the reservoir
to the first piston of the perforating assembly, and another valving
position in which another outlet in the body is aligned with the
corresponding outlet in the sleeve to fluidly connect the reservoir
to the second piston of the perforating assembly; and

wherein the apparatus further comprises a push tube slidably supported in the housing
and having first and second ends, the second end sized and positioned to engage the
sleeve of the valve to cause axial movement thereof.

Claim 17 (Original). The apparatus of claim 16 wherein the push tube defines a flow passage, wherein the push tube is sealingly slidable on the support stem of the housing, wherein the support stem defines a flow passage continuous with the flow passage of the push tube, wherein the flow passage of the support stem is fluidly
5 connected to the cylinder of the perforating assembly so that the flow path in the piercing member is continuous with the support stem.

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Claim 18 (Previously Presented). The apparatus of claim 17 wherein the housing comprises a second flow path inside the housing above the valve body, wherein the housing comprises an outlet connecting the second flow path with the outside of the housing, wherein the push tube includes an opening positioned to be open to the
5 second flow path in the housing when the sleeve is in the closed position and to be sealed by the support stem when the sleeve is in one of the plurality of valving positions, so that when the apparatus is positioned in the tubular structure and the sleeve is in the closed position, fluid can be passed through the push tube, out the opening in the push tube into the second flow path in the housing, through the outlet in the housing to the outside of the
10 housing, and so that when the sleeve is in one of the valving positions, fluid can be passed through the push tube, into the support stem through the perforating assembly and through the piercing member.

Claim 19 (Currently Amended). The apparatus of claim 1 wherein ~~the seal assembly comprises a setting/pack-off assembly adapted to secure the apparatus at the selected position in the tubular structure,~~ the setting/pack-off assembly comprising comprises:

5 a back-up plate sized to engage the tubular structure and movable in a first direction from a retracted position in which the back-up plate does not engage the tubular structure to an extended position in which the back-up plate engages the tubular structure;

10 a packer on the sidewall opposite the back-up plate shaped and positioned to surround the piercing member when the piercing member is in the second position;

a cylinder supported in the housing;

B1 a fluid-driven piston sealingly slidable within the cylinder and dividing the cylinder into a first chamber and a second chamber;

15 a stem extending between the back-up plate and the piston;

and wherein the apparatus further comprises a pressurized fluid reservoir fluidly connected to the cylinder so that when the reservoir is filled with pressurized fluid the fluid can drive the piston; and

wherein the control assembly comprises a valve adapted to control the flow of
20 pressurized fluid from the reservoir to the cylinder, wherein the first chamber of the cylinder is fluidly connected to the pressurized fluid reservoir to push the piston in the first direction when the reservoir contains pressurized fluid, and wherein the valve controls the flow of fluid from the fluid reservoir to the cylinder of the setting/pack-off assembly.

Claim 20 (Original). The apparatus of claim 19 wherein the apparatus further comprises a dump chamber adapted to receive fluid, wherein the back-up plate is further defined as movable in a second direction from the extended position to the

retracted position, wherein the second chamber of the cylinder is fluidly connected to the
5 pressurized fluid reservoir to push the piston in the second direction when the reservoir
contains pressurized fluid, wherein the first chamber of the cylinder is fluidly connected
to the dump chamber, wherein the valve controls flow of fluid into the second chamber of
the back-up plate cylinder to push the piston in the second direction and permits fluid in
the first chamber of the back-up plate cylinder to escape to the dump chamber in response
10 to movement of the piston in the second direction.

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Claim 21 (Currently Amended). The apparatus of claim 1 wherein
~~perforating assembly is fluid driven, wherein~~ the apparatus further comprises a
pressurized fluid reservoir, and wherein the control assembly comprises a valve for
controlling fluid flow from the reservoir to the perforating assembly, the valve
5 comprising:

a valve body having a tubular sidewall defining a longitudinal
throughbore, wherein the sidewall comprises an inlet fluidly
connected to the pressurized fluid reservoir and an outlet fluidly
connected to the perforating assembly;
10 a sleeve sealingly slidable along the inside of the throughbore of the valve
body;
wherein the sleeve comprises an outer wall, an inner wall, an annular
space therebetween, a fluid inlet in the outer wall in fluid
communication with the annular space, and an outlet in the outer
15 wall in fluid communication with the annular space;

wherein the sleeve is axially movable from a closed position, in which the outlet in the sleeve is not aligned with the outlet in the body, to a valving position in which the outlet in the body is aligned with the outlet in the sleeve; and

20 wherein the apparatus further comprises a push tube slidably supported in the housing and having first and second ends, the second end sized and positioned to engage the sleeve of the valve to cause axial movement thereof to move the sleeve from the closed position to the valving position.

Claim 22 (Currently Amended). A perforating system for perforating the casing in a subterranean well, the system comprising:

a rotatable and axially movable elongate conduit sized to be received in the casing, the conduit having an end extendable into the casing;

5 a perforating apparatus, ~~the apparatus~~ comprising:

a housing having a first end defining an inlet, the first end being connectable to the end of the conduit so that the conduit is continuous with the inlet of the housing, wherein the housing defines an operating fluid flow path beginning with the inlet and wherein the housing is supportable at a selected position in the casing;

~~wherein the housing being supportable at a selected position in the casing;~~

a fluid driven perforating assembly in the housing, the perforating assembly comprising a piercing member supported for

movement from a first position within the housing to a second position in which a portion of the piercing member is extendable beyond the housing to perforate the well casing, wherein the piercing member comprises a fluid flow path;

wherein the perforating assembly defines a fluid flow path continuous with the operating fluid flow path through the housing and the fluid flow path in the piercing member so that when the piercing member is in the second position a continuous flow path is formed between the conduit and the portion of the piercing member that is extendable through the well casing;

~~a seal assembly comprising an elastic seal adapted to provide a seal between the inside of the casing outside the apparatus and the fluid flow paths in the housing, the piercing member and the perforating assembly of the apparatus; and~~

a fluid driven setting/pack-off assembly adapted to releasably secure the housing at the selected position in the tubular structure and to provide a releasable seal between the inside of the tubular structure outside the apparatus and the fluid flow paths in the housing, the piercing

member and the perforating assembly of the apparatus;

and

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a non-electrical control assembly adapted to control movement of
the piercing member and the setting/pack off assembly.

Claim 23 (Previously Presented). The system of claim 22 wherein the
perforating apparatus further comprises a releasable lock assembly operable by rotation
of the elongate conduit between a locked position, in which the elongate conduit is fixed
relative to the housing, and an unlocked position, in which the elongate conduit is axially
5 movable relative to the housing.

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Claim 24 (Original). The system of claim 22 further comprising a friction
member on the housing sized to frictionally engage the well casing as the apparatus is
pushed therethrough.

Claim 25 (Original). The system of claim 24 wherein the friction
member is a bow-spring centralizer.

Claim 26 (Previously Presented). The system of claim 23 wherein the
perforating assembly comprises a cylinder, wherein the piercing member is slidably
supported in the cylinder, wherein the perforating assembly further comprises a first
fluid-driven piston in the cylinder for driving the movement of the piercing member,
5 wherein the apparatus further comprises a pressurized fluid reservoir fluidly connected to
the cylinder so that when the reservoir is filled with pressurized fluid the fluid can drive
the piston, and wherein the control assembly comprises a valve adapted to control the
flow of pressurized fluid from the reservoir to the cylinder.

Claim 27 (Currently Amended). The system of claim 26 wherein the ~~seal assembly comprises a~~ setting/pack-off assembly ~~adapted to secure the apparatus at the selected position in the well casing, the setting/pack-off assembly comprising~~ comprises:

5 a back-up plate sized to engage the well casing and movable in a first direction from a retracted position in which the back-up plate does not engage the well casing to an extended position in which the back-up plate engages the well casing;

a packer on the sidewall opposite the back-up plate shaped and
10 positioned to surround the piercing member when the piercing
member is in the second position;

a cylinder supported in the housing;

a fluid-driven piston sealingly slidable within the cylinder and dividing the cylinder into a first chamber and a second chamber;

15 a stem extending between the back-up plate and piston and;

wherein the first chamber of the cylinder is fluidly connected to the pressurized fluid reservoir to push the piston in the first direction when the reservoir contains pressurized fluid; and

wherein the valve controls the flow of fluid from the fluid reservoir to the cylinder of the
20 setting/pack-off assembly.

Claim 28 (Original). The system of claim 27 wherein the housing of the perforating apparatus is cylindrical defining a side wall, wherein the piercing member extends radially through the side wall, wherein the back-up plate extends radially from

the side wall of the housing and is positioned to move opposingly to the piercing
5 member.

Claim 29 (Previously Presented). The system of claim 27 wherein the
piercing member comprises a base and is movable from the second position to a third
position in which the base is extendable through the perforation in the well casing to
occlude the perforation, wherein first piston of the perforating assembly comprises a
5 recess, wherein the perforating assembly further comprises a second fluid-driven piston
slidably receivable in the recess for driving movement of the piercing member from the
second position to the third position, wherein the recess is fluidly connected to the
pressurized fluid reservoir so that when the reservoir is filled with pressurized fluid the
fluid can drive the movement of the second piston, and wherein the valve is adapted to
10 control the flow of fluid from the reservoir to the recess.

Claim 30 (Previously Presented). The system of claim 29 wherein the
valve comprises:

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a valve body having a tubular sidewall defining a longitudinal
throughbore, wherein the sidewall comprises a first inlet fluidly
5 connected to the pressurized fluid reservoir, and a plurality of
longitudinally spaced-apart outlets, a first one of the plurality of
outlets fluidly connected to the first chamber of the cylinder of the
setting/pack-off assembly to drive the piston in the first direction, a
second one of the plurality of outlets fluidly connected to the
10 cylinder of the perforating assembly to drive the movement of the
first piston, a third one of the plurality of outlets fluidly connected

to the cylinder of the perforating assembly to drive the movement of the second piston;

a sleeve sealingly slidable along the inside of the throughbore of the valve body;

wherein the sleeve comprises an outer wall, an inner wall, an annular space therebetween, a fluid inlet in the outer wall in fluid communication with the annular space, and a plurality of outlets in the outer wall in fluid communication with the annular space, each one of the plurality of outlets corresponding to a respective one of the plurality of outlets in the valve body;

wherein the sleeve is axially movable from a closed position, in which none of the outlets in the sleeve is aligned with an outlet in the body, to a plurality of valving positions including a first valving position in which the first outlet in the body is aligned with the corresponding outlet in the sleeve, a second valving position in which the second outlet in the body is aligned with the corresponding outlet in the sleeve, and a third valving position in which the third outlet in the body is aligned with the corresponding outlet in the sleeve; and

wherein the perforating apparatus further comprises a push tube slidably supported in the housing and having first and second ends, the first end connectable to the elongate conduit for axial movement therewith when the lock assembly is in the unlocked position, the second end sized and positioned to engage the sleeve of the valve to cause axial

35 movement thereof to move the sleeve from the closed position to the plurality of valving positions.

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5 Claim 31 (Original). The system of claim 30 wherein the perforating apparatus further comprises a dump chamber adapted to receive fluid, wherein the back-up plate is further defined as movable in a second direction from the extended position to the retracted position, wherein the plurality of outlets in the valve body includes a fourth
10 outlet fluidly connected to the second chamber of the cylinder of the setting/pack-off assembly to drive the movement of the piston in the second direction, wherein the valve body includes a second inlet fluidly connected to the first chamber of the cylinder of the setting/pack-off assembly, wherein the valve body includes a fifth outlet fluidly connected to the dump chamber, wherein the sleeve of the valve comprises a pass-through channel, and wherein the sleeve is movable to a fourth valving position in which
15 the fourth outlet in the body is aligned with the corresponding outlet in the sleeve to direct pressurized fluid into the second chamber of the back-up plate cylinder and in which the pass-through channel in the sleeve connects the second inlet of the valve body with the fifth outlet to permit fluid in the first chamber of the back-up plate cylinder to escape to the dump chamber.

5 Claim 32 (Original). The system of claim 31 wherein the housing comprises a support stem fixed relative to the housing and receivable inside the sleeve of the valve sleeve, wherein the push tube defines a flow passage continuous with the elongate conduit, wherein the push tube is sealingly slidable on the support stem, wherein
the support stem defines a flow passage continuous with the flow passage of the push tube, wherein the flow passage of the support stem is fluidly connected to the cylinder of

the perforating assembly so that the flow path in the piercing member is continuous with the support stem.

Claim 33 (Original). The system of claim 32 wherein the housing comprises a second flow path inside the housing above the valve body, wherein the housing comprises an outlet connecting the second flow path with the outside of the housing, wherein the push tube includes an opening positioned to be open to the second
5 flow path in the housing when the sleeve is in the closed position and to be sealed by the support stem when the sleeve is in one of the plurality of valving positions, so that when the apparatus is connected to the elongate outlet and positioned in the tubular structure fluid can be passed through the elongate conduit, through the push tube, through the opening in the push tube into the second flow path in the housing, through the outlet in
10 the housing to the outside of the housing.

Claim 34 (Previously Presented). The system of claim 22 wherein the perforating assembly comprises a cylinder, wherein the piercing member is slidably supported in the cylinder, wherein the perforating assembly further comprises a first fluid-driven piston in the cylinder for driving the movement of the piercing member,
5 wherein the perforating apparatus further comprises a pressurized fluid reservoir fluidly connected to the cylinder so that when the reservoir is filled with pressurized fluid the fluid can drive the piston, and wherein the control assembly comprises a valve adapted to control the flow of pressurized fluid from the reservoir to the cylinder.

Claim 35 (Previously Presented). The system of claim 34 wherein the piercing member comprises a base, wherein the piercing member is movable from the

second position to a third position in which the base is extendable through the perforation to occlude the perforation, wherein first piston comprises a recess, wherein the
5 perforating assembly further comprises a second fluid-driven piston slidably receivable in the recess for driving movement of the piercing member from the second position to the third position, wherein the recess is fluidly connected to the pressurized fluid reservoir so that when the reservoir is filled with pressurized fluid the fluid can drive the movement of the second piston, and wherein the valve is adapted to control the flow of fluid from
10 the reservoir to the recess.

Claim 36 (Original). The system of claim 35 wherein the valve comprises:

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5 a valve body having a tubular sidewall defining a longitudinal throughbore, wherein the sidewall comprises a first inlet fluidly connected to the pressurized fluid reservoir, and a plurality of longitudinally spaced-apart outlets, one of the plurality of outlets fluidly connected to the cylinder of the perforating assembly to drive the movement of the first piston, another one of the plurality of outlets fluidly connected to the cylinder of the perforating
10 assembly to drive the movement of the second piston;

a sleeve sealingly slidable inside the throughbore of the valve body;
wherein the sleeve comprises an outer wall, an inner wall, an annular space therebetween, a fluid inlet in the outer wall in fluid communication with the annular space, and a plurality of outlets in
15 the outer wall in fluid communication with the annular space, each

one of the plurality of outlets corresponding to a respective one of the plurality of outlets in the valve body;

wherein the sleeve is axially movable from a closed position, in which none of the outlets in the sleeve is aligned with an outlet in the body, to a plurality of valving positions including one valving position in which an outlet in the body is aligned with the corresponding outlet in the sleeve to fluidly connect the reservoir to the first piston of the perforating assembly, and another valving position in which another outlet in the body is aligned with the corresponding outlet in the sleeve to fluidly connect the reservoir to the second piston of the perforating assembly; and

wherein the perforating apparatus further comprises a push tube slidably supported in the housing and having first and second ends, the second end sized and positioned to engage the sleeve of the valve to cause axial movement thereof.

Claim 37 (Original). The system of claim 36 wherein apparatus further comprises a support stem fixed relative to the housing, wherein the push tube defines a flow passage, wherein the push tube is sealingly slidable on the support stem, wherein the support stem defines a flow passage continuous with the flow passage of the push tube, wherein the flow passage of the support stem is fluidly connected to the cylinder of the perforating assembly so that the flow path in the piercing member is continuous with the support stem.

Claim 38 (Previously Presented). The system of claim 37 wherein the housing comprises a second flow path inside the housing above the valve body, wherein

the housing comprises an outlet connecting the second flow path with the outside of the housing, wherein the push tube includes an opening positioned to be open to the second flow path in the housing when the sleeve is in the closed position and to be sealed by the support stem when the sleeve is in one of the plurality of valving positions, so that when the apparatus is positioned in the well casing and the sleeve is in the closed position, fluid can be passed through the push tube, out the opening in the push tube into the second flow path in the housing, through the outlet in the housing to the outside of the housing and up through the elongate conduit, and so that when the sleeve is in one of the valving positions, fluid can be passed through the push tube, into the stem through the perforating assembly and through the piercing member through the perforation in the well casing.

Claim 39 (Currently Amended). The system of claim 22 wherein the ~~seal assembly comprises a setting/pack-off assembly adapted to secure the apparatus at the selected position in the well casing, the setting/pack-off assembly comprising~~ comprises:

a back-up plate sized to engage the well casing and movable in a first direction from a retracted position in which the back-up plate does not engage the well casing to an extended position in which the back-up plate engages the well casing;

a packer on the sidewall opposite the back-up plate shaped and positioned to surround the piercing member when the piercing member is in the second position;

a cylinder supported in the housing;

15 a fluid-driven piston sealingly slidable within the cylinder and
dividing the cylinder into a first chamber and a second
chamber;

a stem extending between the back-up plate and the piston; and
wherein the perforating apparatus further comprises a pressurized fluid reservoir fluidly
connected to the cylinder so that when the reservoir is filled with pressurized fluid the
20 fluid can drive the piston; and

wherein the control assembly comprises a valve adapted to control the flow of
pressurized fluid from the reservoir to the cylinder, wherein the first chamber of the
cylinder is fluidly connected to the pressurized fluid reservoir to push the piston in the
first direction when the reservoir contains pressurized fluid, and wherein the valve
25 controls the flow of fluid from the fluid reservoir to the cylinder of the setting/pack-off
assembly.

Claim 40 (Original). The system of claim 39 wherein the perforating
apparatus further comprises a dump chamber adapted to receive fluid, wherein the back-
up plate is further defined as movable in a second direction from the extended position to
the retracted position, wherein the second chamber of the cylinder is fluidly connected to
5 the pressurized fluid reservoir to push the piston in the second direction when the
reservoir contains pressurized fluid, wherein the first chamber of the cylinder is fluidly
connected to the dump chamber, wherein the valve controls flow of fluid into the second
chamber of the back-up plate cylinder to push the piston in the second direction and
permits fluid in the first chamber of the back-up plate cylinder to escape to the dump
10 chamber in response to movement of the piston in the second direction.

Claim 41 (Currently Amended) The system of claim 22 wherein
~~perforating assembly is fluid driven, wherein~~ the perforating apparatus further
comprises a pressurized fluid reservoir, and wherein the control assembly comprises a
valve for controlling fluid flow from the reservoir to the perforating assembly; the valve
5 comprising:

a valve body having a tubular sidewall defining a longitudinal
throughbore, wherein the sidewall comprises an inlet fluidly
connected to the pressurized fluid reservoir and an outlet fluidly
connected to the perforating assembly;

10 a sleeve sealingly slidable inside the throughbore of the valve body;

wherein the sleeve comprises an outer wall, an inner wall, an annular
space therebetween, a fluid inlet in the outer wall in fluid
communication with the annular space, and an outlet in the outer
wall in fluid communication with the annular space;

15 wherein the sleeve is axially movable from a closed position, in which the
outlet in the sleeve is not aligned with the outlet in the body, to a
valving position in which the outlet in the body is aligned with the
outlet in the sleeve; and

wherein the perforating apparatus further comprises a push tube slidably supported in the
20 housing and having first and second ends, the second end sized and positioned to engage
the sleeve of the valve to cause axial movement thereof to move the sleeve from the
closed position to the valving position.

42 (Withdrawn). A valve for directing fluid from a source of pressurized fluid to one of a plurality of fluid-operated devices, the valve comprising:

5 a valve body having a tubular sidewall defining a longitudinal throughbore, wherein the sidewall comprises a first inlet fluidly connectable to the fluid source, and a plurality of longitudinally spaced-apart outlets, each of the plurality of outlets connectable to a different one of the fluid-operated devices;

a sleeve sealingly slidable inside the throughbore of the valve body;

10 wherein the sleeve comprises an outer wall, an inner wall, an annular space therebetween, a fluid inlet in the outer wall in fluid communication with the annular space, and a plurality of outlets in the outer wall in fluid communication with the annular space, each one of the plurality of outlets corresponding to a respective one of the plurality of outlets in the valve body;

15 wherein the sleeve is axially movable from a closed position, in which none of the outlets in the sleeve is aligned with its corresponding outlet in the body, to a plurality of valving positions in which the inlet in the sleeve is aligned with the inlet in the valve body and in which one of the plurality of outlets in the valve body is aligned
20 with the corresponding outlet in the sleeve, so that in each of the valving positions, fluid from fluid source is directed to the respective one of the fluid-operated devices.

43 (Withdrawn). The valve of claim 42 wherein the stem is hollow.

44 (Withdrawn). A method for establishing a fluid flow path between one end of a tubular structure and a selected area outside the tubular structure a distance from the end, the method comprising:

5 perforating the tubular structure at a position near the selected area; and
 flowing flowable material between the end of the tubular structure and the
 selected area outside the tubular structure without leaving a
 significant amount of the fluid inside the tubular structure.

45 (Withdrawn). The method of claim 44 wherein the tubular structure is the casing in a subterranean well.

B1 46.(Withdrawn) The method of claim 44 wherein the flowing step
comprises injecting the flowable material through the perforation into the selected area.

47.(Withdrawn) The method of claim 46 further comprising the step
of plugging the perforation after the flowable material has been injected.

Claim 48 (Currently Amended). An apparatus for perforating a
tubular structure, the apparatus comprising:

5 a housing having an inlet and an outlet;
 a fluid-driven piercing member supported for movement from a first
 position within the housing to a second position in which a portion
 of the piercing member is extendable through the tubular structure,
 wherein the piercing member comprises a fluid flow path;

10

wherein the housing defines an operating fluid flow path beginning with the inlet and connectable alternately with the fluid flow path in the piercing member and the outlet of the housing;

a pressurized fluid reservoir fluidly connected to the fluid driven piercing member;

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a first valve adapted to control flow of fluid between the ~~high-pressure~~ pressurized fluid reservoir and the piercing member to drive the movement of the piercing member from the first position to the second position; and

a second valve adapted to control flow of fluid between the operating flow path in the housing and to either of the flow path in the piercing member and the outlet of the housing.

Claim 49 (Original). The apparatus of claim 48 wherein the inlet of the apparatus is connectable to an elongate conduit extendable through the tubular structure and wherein the first valve is operable by axial movement of the conduit when it is connected to the apparatus.

Claim 50 (Original). The apparatus of claim 49 wherein the second valve is operable by axial movement of the conduit when it is connected to the apparatus.

Claim 51 (Previously Presented). The apparatus of claim 48 wherein the inlet of the apparatus is connectable to an elongate conduit extendable through the tubular structure and wherein the apparatus further comprises a releasable lock assembly operable by rotation of the elongate conduit between a locked position, in which the

5 elongate conduit is fixed relative to the housing, and an unlocked position, in which the elongate conduit is axially movable relative to the housing.

Claim 52 (Original). The apparatus of claim 51 wherein the first valve is operable by axial movement of the conduit when it is connected to the apparatus.

Claim 53 (Original). The apparatus of claim 51 wherein the second valve is operable by axial movement of the conduit when it is connected to the apparatus.

Claim 54 (Previously Presented). The apparatus of claim 53 wherein the first valve comprises:

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5 a valve body having a tubular sidewall defining a longitudinal throughbore, wherein the sidewall comprises a first inlet fluidly connected to the pressurized fluid reservoir, and an outlet fluidly connected to the piercing member;

a stem supported non-movingly and longitudinally within the throughbore of the valve body;

10 a sleeve sealingly slidable along the outside of the stem and inside the throughbore of the valve body;

wherein the sleeve comprises an outer wall, an inner wall, an annular space therebetween, a fluid inlet in the outer wall in fluid communication with the annular space, and an outlet in the outer wall in fluid communication with the annular space;

15 wherein the sleeve is axially movable from a closed position, in which the outlet in the sleeve is not aligned with the outlet in the body, to a

valving position in which the outlet in the body is aligned with the
outlet in the sleeve, and

wherein the apparatus further comprises a push tube slidably supported in the housing
20 and having first and second ends, the first end connectable to the elongate conduit for
axial movement therewith when the lock assembly is in the unlocked position, the second
end sized and positioned to engage the sleeve of the valve to cause axial movement
thereof to move the sleeve from the closed position to the valving position.

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5 Claim 55 (Original). The apparatus of claim 54 wherein the housing
comprises a second flow path inside the housing above the valve body, wherein the outlet
in the housing connects the second flow path with the outside of the housing, wherein the
second valve comprises an opening in the push tube positioned to be open to the second
5 flow path in the housing when the sleeve is in the closed position and to be sealed by the
stem when the sleeve is in the valving position, so that when the apparatus is connected
to the elongate outlet and positioned in the tubular structure fluid can be passed through
the elongate conduit alternately out the outlet in the housing to the outside of the housing
when the sleeve is in the closed position or through the piercing member out the
10 perforation when the sleeve is in the valving position.

Claim 56 (Currently Amended). An apparatus for perforating a
tubular structure, the apparatus comprising:

a housing;

a fluid driven piercing member supported in the housing for movement
5 from a first position within the housing to a second position in

which a portion of the piercing member is extendable through the tubular structure;

a fluid driven-setting/pack-off assembly adapted to secure the apparatus temporarily at a selected position in the tubular structure, the setting/pack-off assembly comprising:

a back-up plate sized to engage the tubular structure and movable in a first direction from a retracted position in which the back-up plate does not engage the tubular structure to an extended position in which the back-up plate engages the tubular structure, and in a second direction from the extended position to the retracted position; and

a packer on the sidewall opposite the back-up plate shaped and positioned to surround the piercing member when the piercing member is in the second position, the packer adapted to provide a seal between the inside of the tubular structure outside the apparatus and the piercing member;

a pressurized fluid reservoir fluidly connected to the setting/pack-off assembly; and

a **non-electrical** valve adapted to control the flow of fluid from the fluid reservoir to the setting/pack-off assembly **and the piercing member.**

Claim 57 (Original). The apparatus of claim 56 wherein the setting/pack-off assembly further comprises:

a cylinder supported in the housing;

a fluid-driven piston sealingly slidable within the cylinder and dividing the

5 cylinder into a first chamber and a second chamber;

a stem extending between the back-up plate and the piston; and

wherein the apparatus further comprises a dump chamber adapted to receive fluid,

wherein the first chamber of the cylinder of the setting/pack-off assembly is fluidly

connected to the pressurized fluid reservoir to drive movement of the back-up plate in the

10 first direction, wherein the second chamber of the cylinder of the setting/pack-off

assembly is fluidly connected to the pressurized fluid reservoir to drive movement of the

back-up plate in the second direction, and wherein the second chamber is fluidly

connected to the dump chamber to receive fluid in response to movement of the back-up

plate in the second direction, wherein the valve controls flow of fluid from the

15 pressurized fluid reservoir to the first and second chambers and from the second chamber

to the dump chamber.

Please cancel claim 58 and 59.